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GRGTEST

Page 1 of 41

# Test Report

Verified code: 438968

Report No.: E20230828994601-2

Customer: Lumi United Technology Co., Ltd

Address: Room 801-804, Building 1, Chongwen Park, Nanshan iPark, No. 3370, Liuxian Avenue, Fuguang Community, Taoyuan Residential District, Nanshan District, Shenzhen, China

Sample Name: Motion and Light Sensor P2

Sample Model: ML-S03D

Receive Sample Date: Aug.28,2023

Test Date: Aug.30,2023 ~ Aug.30,2023

Reference Document: ETSI EN 300 328 V2.2.2 (2019-07)

Test Result: Pass

Prepared by: Chen Xiaocong  
Chen Xiaocong

Reviewed by: Jiang Tao  
Jiang Tao

Approved by: Xiao Liang  
Xiao Liang

GRG METROLOGY & TEST GROUP CO., LTD.

Issued Date: 2023-11-23

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**REPORT ISSUED HISTORY**

| Report Version | Report No.        | Description    | Compile Date |
|----------------|-------------------|----------------|--------------|
| 1.0            | E20230828994601-2 | Original Issue | 2023-11-01   |

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## 1. TEST RESULT SUMMARY

| Test Item  | Test mode | Test Requirement              | Test Method                    | Class / Severity                                    | Test Result       |
|--|-----------|-------------------------------|--------------------------------|---|-------------------|
| <b>1. Transmitter Part</b>                                     |           |                               |                                |   |                   |
| RF Output Power  | Mode 1    | EN300 328 V2.2.2/<br>4.3.2.2  | EN300 328<br>V2.2.2/5.4.2.2.1  | Meet requirements:<br>EN300 328 V2.2.2/ 4.3.2.2     | PASS              |
| Power Spectral Density   | Mode 1    | EN300 328<br>V2.2.2/4.3.2.3   | EN300 328<br>V2.2.2/5.4.3.2.1  | Meet requirements:<br>EN300 328 V2.2.2/4.3.2.3      | PASS              |
| Duty Cycle,<br>Tx-sequence, Tx-gap                             | Mode 1    | EN300 328<br>V2.2.2/4.3.2.4   | EN300 328<br>V2.2.2/5.4.2.2.1  | Meet requirements:<br>EN300 328 V2.2.2/4.3.2.4      | N/A <sup>1)</sup> |
| Medium Utilisation<br>(MU) factor                              | Mode 1    | EN300 328 V2.2.2/<br>4.3.2.5  | EN300 328<br>V2.2.2/5.4.2.2    | Meet requirements:<br>EN300 328 V2.2.2/ 4.3.2.5     | N/A <sup>2)</sup> |
| Adaptivity   | Mode 3    | EN300 328 V2.2.2/<br>4.3.2.6  | EN300 328<br>V2.2.2/5.4.6.2.1  | Meet requirements:<br>EN300 328 V2.2.2/ 4.3.2.6     | N/A <sup>1)</sup> |
| Occupied Channel<br>Bandwidth                                  | Mode 1    | EN300 328 V2.2.2/<br>4.3.2.7  | EN300 328<br>V2.2.2/5.4.7.2.1  | Meet requirements:<br>EN300 328 V2.2.2/ 4.3.2.7     | PASS              |
| Transmitter unwanted<br>emissions in the<br>out-of-band domain | Mode 1    | EN300 328 V2.2.2/<br>4.3.2.8  | EN300 328<br>V2.2.2/5.4.8.2.1  | Meet requirements:<br>EN300 328 V2.2.2/ 4.3.2.8     | PASS              |
| Transmitter unwanted<br>emissions in the<br>spurious domain    | Mode 1    | EN300 328 V2.2.2/<br>4.3.2.9  | EN300 328<br>V2.2.2/5.4.9.2.2  | Meet requirements:<br>EN300 328 V2.2.2/ 4.3.2.9     | PASS              |
| <b>2. Receiver Part</b>  |           |                               |                                |   |                   |
| Receiver spurious<br>emissions                                 | Mode 2    | EN300 328 V2.2.2/<br>4.3.2.10 | EN300 328<br>V2.2.2/5.4.10.2.2 | Meet requirements:<br>EN300 328 V2.2.2/<br>4.3.2.10 | PASS              |
| Receiver Blocking  | Mode 3    | EN300 328 V2.2.2/<br>4.3.2.11 | EN300 328<br>V2.2.2/5.4.11.2.1 | Meet requirements:<br>EN300 328 V2.2.2/<br>4.3.2.11 | PASS              |

Note:

1. This item does not apply for equipment with a declared RF Output power level of less than 10 dBm e.i.r.p. or for equipment when operating in a mode where the RF Output power is less than 10 dBm e.i.r.p., but the EUT power is less than 10dBm, so it is not applied.
2. This requirement does not apply for non-FHSS equipment with a maximum declared RF Output power level of less than 10 dBm e.i.r.p. or for non-FHSS equipment when operating in a mode where the RF Output power is less than 10 dBm e.i.r.p.

## 2. GENERAL DESCRIPTION OF EUT

### 2.1 APPLICANT INFORMATION

Name: Lumi United Technology Co., Ltd  
Address: Room 801-804, Building 1, Chongwen Park, Nanshan iPark, No. 3370, Liuxian Avenue, Fuguang Community, Taoyuan Residential District, Nanshan District, Shenzhen, China

### 2.2 MANUFACTURER

Name: Lumi United Technology Co., Ltd  
Address: Room 801-804, Building 1, Chongwen Park, Nanshan iPark, No. 3370, Liuxian Avenue, Fuguang Community, Taoyuan Residential District, Nanshan District, Shenzhen, China

### 2.3 BASIC DESCRIPTION OF EUT

Product Name: Motion and Light Sensor P2  
Product Model: ML-S03D  
Adding Model: ML-S03E  
Models Difference: ML-S03E & ML-S03D have the same technical construction including circuit diagram, PCB LAYOUT, hardware version and software version identical, except sales area and packaging are different.  
Trade Name: Aqara  
Power Supply: DC 3V power supplied by battery  
Battery Specification: Model:CR2450  
Norminal Voltage:3.0Vdc  
Frequency Band: 2405MHz-2480MHz  
Modulation Type: O-QPSK  
Antenna Specification: PIFA antenna 0.95dBi gain (Max.)  
Sample submitting way:  Provided by customer  Sampling  
Sample No: E20230828994601-0003, E20230828994601-0006  
Temperature Range: -10 °C ~ 55 °C  
Hardware Version: X3  
Software Version: 0.0.0.1  
Note 1: The EUT antenna gain is provided by the applicant. This report is made solely on the basis of such data and/or information. We accept no responsibility for the authenticity and completeness of the above data and information and the validity of the results and/or conclusions.  
Note 2: All the tests were performed on the model ML-S03D.

## 2.4 TEST MODE

- Test mode 1: Thread fixed transmitting mode  
 Test mode 2: Thread receiving mode  
 Test mode 3: Thread normal mode

## 2.5 FREQUENCY BAND AND THE TEST FREQUENCY

| Channel No. | Frequency (MHz) |
|-------------|-----------------|-------------|-----------------|-------------|-----------------|-------------|-----------------|
| *11         | 2405            | 12          | 2410            | 13          | 2415            | 14          | 2420            |
| 15          | 2425            | 16          | 2430            | 17          | 2435            | *18         | 2440            |
| 19          | 2445            | 20          | 2450            | 21          | 2455            | 22          | 2460            |
| 23          | 2465            | 24          | 2470            | 25          | 2475            | *26         | 2480            |

\* is the test frequency

## 2.6 DESCRIPTION OF ADAPTIVE EQUIPMENT

|  |  |  |   |   |  |  |  |  |  |
|--|--|--|---|---|--|--|--|--|--|
| The type of the equipment                          | <input type="checkbox"/> FHSS                                    | <input checked="" type="checkbox"/> other forms of modulation  | <input type="checkbox"/> Non-FHSS   |   |  |  |  |  |  |
| Adaptive / non-adaptive equipment                  | <input checked="" type="checkbox"/> Non-adaptive Equipment       | <input type="checkbox"/> adaptive Equipment without the possibility to switch to a non-adaptive mode | <input type="checkbox"/> adaptive Equipment which can also operate in a non-adaptive mode |   |  |  |  |  |  |
| The equipment has an implemented                   | <input type="checkbox"/> Frame Based equipment                   | <input type="checkbox"/> Load Based equipment  | <input type="checkbox"/> non-LBT based DAA mechanism                                      | <input checked="" type="checkbox"/> other |  |  |  |  |  |
| Device Class                                       | <input type="checkbox"/> Wi-Fi                                   | <input type="checkbox"/> Bluetooth Low Energy  | <input type="checkbox"/> Bluetooth EDR/BR   | <input type="checkbox"/> BT 5.2           |  |  |  |  |  |
| Wi-Fi Channel Bandwidth                            | <input type="checkbox"/> 20MHz                                   | <input type="checkbox"/> 40MHz   | <input type="checkbox"/> 80MHz  | <input type="checkbox"/> 160MHz           |  |  |  |  |  |
| Antenna Gain                                       | <input checked="" type="checkbox"/> Antenna 1 0.95dBi            | <input type="checkbox"/> Antenna 2 dBi   | <input type="checkbox"/> Antenna 3 dBi  | <input type="checkbox"/> Antenna 4 dBi    |  |  |  |  |  |
| Beamforming Gain                                   | <input type="checkbox"/> Yes, dBi                                | <input checked="" type="checkbox"/> No   |   |   |  |  |  |  |  |
| Extreme operating conditions                       | <input checked="" type="checkbox"/> Operating temperature range: | <input checked="" type="checkbox"/> Min -10°C  | <input checked="" type="checkbox"/> Max 55°C  |   |  |  |  |  |  |
| Blocking   | <input checked="" type="checkbox"/> PER                          | <input type="checkbox"/> The manufacturer may declare alternative performance criteria               |   |   |  |  |  |  |  |
| Geo-location capability supported by the equipment | <input type="checkbox"/> Yes                                     | <input checked="" type="checkbox"/> No   |   |   |  |  |  |  |  |

The maximum RF output power is 9.78 dBm, so the EUT is Receiver Category 2 equipment.

### 3. LABORATORY

The tests and measurements refer to this report were performed by Shenzhen EMC Laboratory of GRG METROLOGY & TEST GROUP CO., LTD.

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### 4. ACCREDITATIONS

Our laboratories are accredited and approved by the following approval agencies according to ISO/IEC 17025.

**China** CNAS(L0446)

Copies of granted accreditation certificates are available for downloading from our web site,  
<http://www.grgtest.com>

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## 5. MEASUREMENTS UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in ETSI EN TR 100 028-1 (i.15) and ETSI EN 100 028-2 (i.8):

| Measurement       | Frequency      | Uncertainty |
|-------------------|----------------|-------------|
| Radiated Emission | 30MHz~200MHz   | 4.0dB       |
|                   | 200MHz~1000MHz | 4.1dB       |
|                   | 1GHz~18GHz     | 4.9dB       |
|                   | 30MHz~200MHz   | 3.9dB       |
|                   | 200MHz~1000MHz | 4.2dB       |
|                   | 1GHz~18GHz     | 5.0dB       |

| Measurement                  | Uncertainty          |
|------------------------------|----------------------|
| RF frequency                 | $6.0 \times 10^{-6}$ |
| RF power conducted           | 0.78 dB              |
| Occupied channel bandwidth   | 0.40 dB              |
| Unwanted emission, conducted | 0.68 dB              |
| Humidity                     | 6.0 %                |
| Temperature                  | 2.0°C                |

This uncertainty represents an expanded uncertainty factor of  $k=2$ .

----- The following blanks -----

## 6. EQUIPMENT AND TOOLS USED DURING TEST

### 6.1 TEST EQUIPMENT AND TOOLS

| Name of Equipment  | Manufacturer | Model       | Serial Number    | Calibration Due |
|--|--------------|-------------|------------------|-----------------|
| <b>Maximum transmit power &amp; Maximum e.i.r.p. spectral density &amp; Occupied channel bandwidth&amp; Transmitter unwanted emissions in the out-of-band domain</b> |              |             |                  |                 |
| Automatic power measuring unit   | TONSCEND     | JS0806-2    | 21B8060365       | 2023-11-17      |
| Programmable constant temperature and humidity test chamber  | HT           | SMC-22PF    | H12204211060-1   | 2024-02-02      |
| Spectrum Analyzer  | R&S          | FSV30       | 104381           | 2023-11-18      |
| BT/WIFI System   | TONSCEND     |             | JS1120-3         |                 |
| <b>Transmitter unwanted emissions in the spurious domain &amp; Receiver spurious emissions</b>   |              |             |                  |                 |
| Spectrum Analyzer  | Agilent      | N9010A      | MY55370330       | 2024-09-08      |
| Spectrum Analyzer  | R&S          | FSV3044     | 101184           | 2024-08-11      |
| Bi-log Antenna   | Schwarzbeck  | VULB9163    | 01279            | 2024-03-05      |
| Horn Antenna   | Schwarzbeck  | BBHA9120D   | 02499            | 2024-08-26      |
| Amplifier  | Tonscend     | TAP 037030  | AP20E8060081     | 2024-04-16      |
| Amplifier  | Tonscend     | TAP01018048 | AP20E8060076     | 2024-04-16      |
| Amplifier  | Tonscend     | TAP9E6343   | AP20E806065      | 2024-04-16      |
| Test software  | tonsclend    |             | JS36-RSE/5.0.0.1 |                 |
| <b>Receiver Blocking</b>   |              |             |                  |                 |
| Signal Generator   | Anritsu      | MG3694A     | #050125          | 2024-07-09      |
| BT/WIFI System   | tonsclend    |             | JS1120-3         |                 |

Note:

1. The calibration cycle of the above instruments is 12 months.

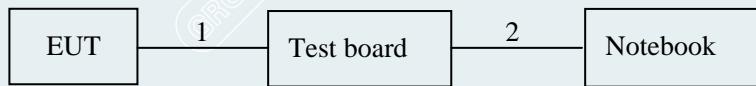
## 6.2 LOCAL SUPPORTIVE INSTRUMENTS

| Name of Equipment | Manufacturer | Model            | Serial Number | Note |
|-------------------|--------------|------------------|---------------|------|
| Notebook          | LENOVO       | TianYi 310-14ISK | MP18DLC6      | /    |
| Test board        | /            | /                | /             | /    |

Note: The notebook is just used to produce fixed frequency transmitting.

| No. | Cable Type | Qty. | Shielded Type | Ferrite Core(Qty.) | Length |
|-----|------------|------|---------------|--------------------|--------|
| 1   | DC cable   | 1    | No            | 0                  | 0.15m  |
| 2   | DC cable   | 1    | No            | 0                  | 1.2m   |

## 6.3 CONFIGURATION OF SYSTEM UNDER TEST



## 6.4 TEST SOFTWARE

| Software version | Test level                             |
|------------------|--|
| QCOM_V1.0        | 2405MHz: 8<br>2440MHz: 8<br>2480MHz: 8 |

----- The following blanks -----

## 7. RADIO TECHNICAL REQUIREMENT SPECIFICATION

### 7.1 RF OUTPUT POWER

Test Requirement: EN300 328 V2.2.2/ 4.3.2.2

Test Method: EN300 328 V2.2.2/5.4.2.2.1

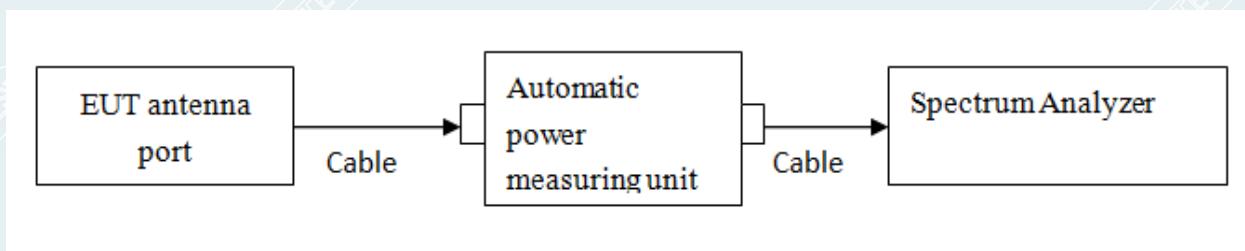
#### 7.1.1 LIMIT

For adaptive equipment, the maximum RF output power shall be 20 dBm.

The maximum RF output power for non-adaptive equipment shall be declared by the manufacturer and shall not exceed 20 dBm. See clause 5.4.1 m). For non-adaptive equipment, the maximum RF output power shall be equal to or less than the value declared by the manufacturer.

This limit shall apply for any combination of power level and intended antenna assembly.

#### 7.1.2 TEST CONFIGURATION



#### 7.1.3 TEST PROCEDURES

Test procedure: Test procedure is according to EN 300 328 V2.2.2/5.4.2.2.1

Test channel: 2405MHz, 2440MHz and 2480MHz for Thread

Test condition: Normal and extreme test conditions

### 7.1.4 TEST RESULTS

Test Date (yy-mm-dd): 2023-08-30

Test Engineer: Qin Tingting

Test environment: Normal condition: 24.1 °C/68%RH/101.0kPa

Extreme test conditions: Low Temp: -10°C  
High Temp: +55°C

| Test Mode | Test Frequency(MHz) | Measurement Conditions                | Test Data             |                    |                | Max. e.i.r.p. Limit(dBm) | Conclusion |
|-----------|---------------------|---------------------------------------|-----------------------|--------------------|----------------|--------------------------|------------|
|           |                     |                                       | Conducted Power (dBm) | Antenna Gain (dBi) | e.i.r.p. (dBm) |                          |            |
| Thread    | 2405                | Normal temperature/<br>Normal voltage | 8.77                  | 0.95               | 9.72           | 20                       | PASS       |
|           | 2440                |                                       | 8.71                  | 0.95               | 9.66           | 20                       | PASS       |
|           | 2480                |                                       | 8.60                  | 0.95               | 9.55           | 20                       | PASS       |

| Test Mode | Test Frequency(MHz) | Measurement Conditions             | Test Data             |                    |                | Max. e.i.r.p. Limit(dBm) | Conclusion |
|-----------|---------------------|------------------------------------|-----------------------|--------------------|----------------|--------------------------|------------|
|           |                     |                                    | Conducted Power (dBm) | Antenna Gain (dBi) | e.i.r.p. (dBm) |                          |            |
| Thread    | 2405                | Low temperature/<br>Normal voltage | 8.83                  | 0.95               | 9.78           | 20                       | PASS       |
|           | 2440                |                                    | 8.74                  | 0.95               | 9.69           | 20                       | PASS       |
|           | 2480                |                                    | 8.60                  | 0.95               | 9.55           | 20                       | PASS       |

| Test Mode | Test Frequency(MHz) | Measurement Conditions              | Test Data             |                    |                | Max. e.i.r.p. Limit(dBm) | Conclusion |
|-----------|---------------------|-------------------------------------|-----------------------|--------------------|----------------|--------------------------|------------|
|           |                     |                                     | Conducted Power (dBm) | Antenna Gain (dBi) | e.i.r.p. (dBm) |                          |            |
| Thread    | 2405                | High temperature/<br>Normal voltage | 8.78                  | 0.95               | 9.73           | 20                       | PASS       |
|           | 2440                |                                     | 8.73                  | 0.95               | 9.68           | 20                       | PASS       |
|           | 2480                |                                     | 8.61                  | 0.95               | 9.56           | 20                       | PASS       |

## 7.2 POWER SPECTRAL DENSITY

Test Requirement: EN300 328 V2.2.2/4.3.2.3

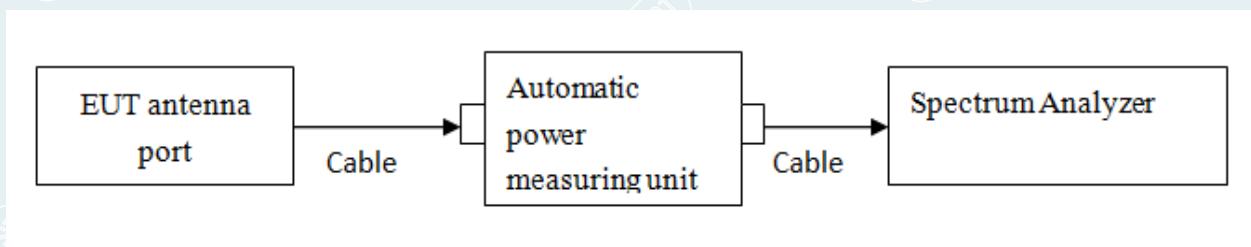
Test Method: EN300 328 V2.2.2/5.4.3.2.1

### 7.2.1 LIMIT

This requirement applies to all types of equipment using wide band modulations other than FHSS.

For equipment using wide band modulations other than FHSS, the maximum Power Spectral Density is limited to 10 dBm per MHz.

### 7.2.2 TEST CONFIGURATION



### 7.2.3 TEST PROCEDURES

Test condition: Normal test conditions

Test channel: 2405MHz, 2440MHz and 2480MHz for Thread

Test procedure: Test procedure is according to EN 300 328 V2.2.2/5.4.3.2.1

----- The following blanks -----

#### 7.2.4 TEST RESULTS

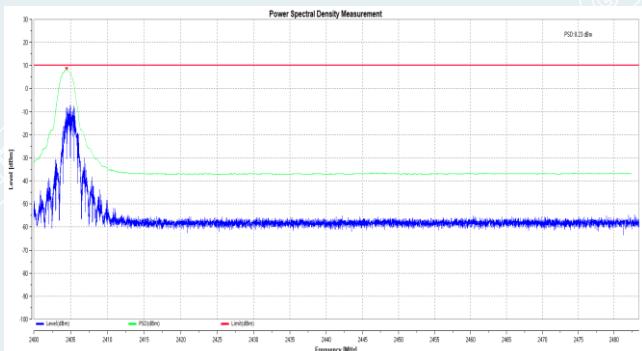
Test Date (yy-mm-dd): 2023-08-30

Test Engineer: Qin Tingting

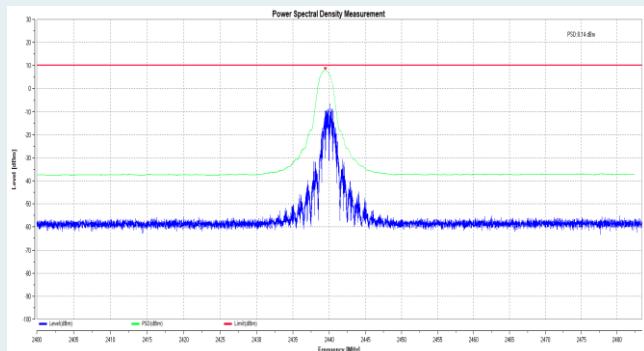
Test environment: Normal condition: 24.1°C/68%RH/101.0kPa

| Test Mode | Frequency [MHz] | PSD[dBm/MHz] | Limit[dBm/MHz] | Verdict |
|-----------|-----------------|--------------|----------------|---------|
| Thread    | 2405            | 8.23         | 10             | PASS    |
|           | 2440            | 8.14         | 10             | PASS    |
|           | 2480            | 7.90         | 10             | PASS    |

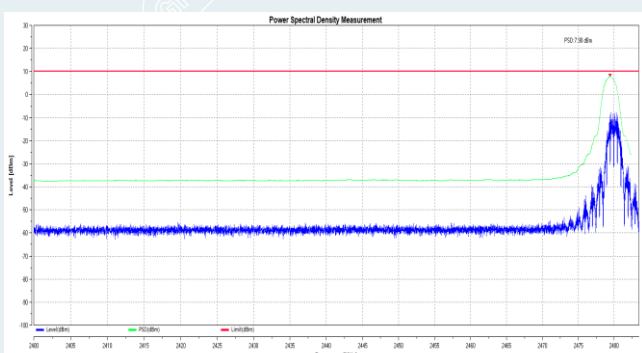
#### 7.2.5 TEST SCREENSHOTS



Lowest Frequency: 2405MHz



Middle Frequency: 2440MHz



Highest Frequency: 2480MHz

### 7.3 OCCUPIED CHANNEL BANDWIDTH

Test Requirement: EN300 328 V2.2.2/ 4.3.2.7

Test Method: EN300 328 V2.2.2/5.4.7.2.1

#### 7.3.1 LIMIT

This requirement applies to all types of non-FHSS equipment.

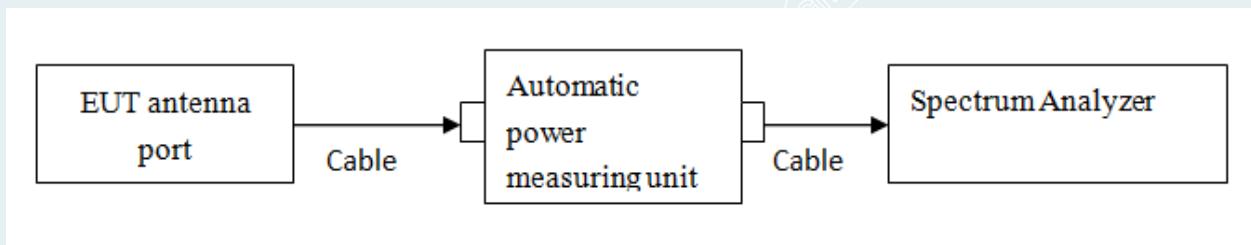
The Occupied Channel Bandwidth shall fall completely within the band given in table 2.

In addition, for non-adaptive equipment using wide band modulations other than FHSS and with e.i.r.p. greater than 10 dBm, the occupied channel bandwidth shall be less than 20 MHz.

Table 2: Service frequency bands

|          | Service frequency bands  |
|----------|--------------------------|
| Transmit | 2 400 MHz to 2 483,5 MHz |
| Receive  | 2 400 MHz to 2 483,5 MHz |

#### 7.3.2 TEST CONFIGURATION



#### 7.3.3 TEST PROCEDURES

Test condition: Normal test conditions.

Test channel: 2405MHz, 2440MHz and 2480MHz for Thread

Test procedure: Test procedure is according to EN 300 328 V2.2.2/5.4.7.2.1

### 7.3.4 TEST RESULTS

Test Date (yy-mm-dd): 2023-08-30

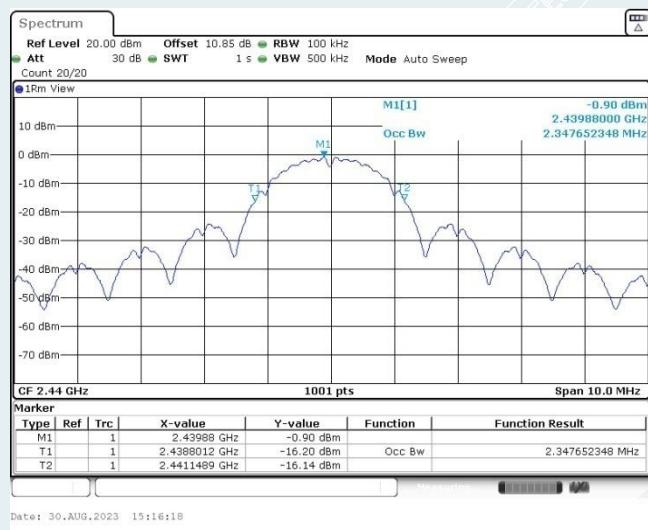
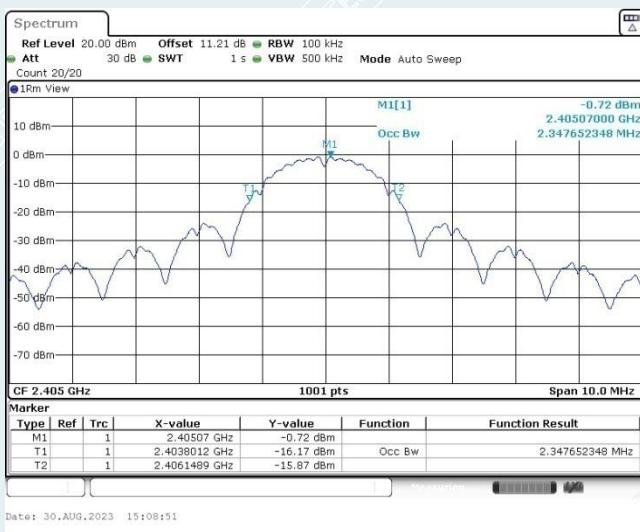
Test Engineer: Qin Tingting

Test environment: Normal condition:

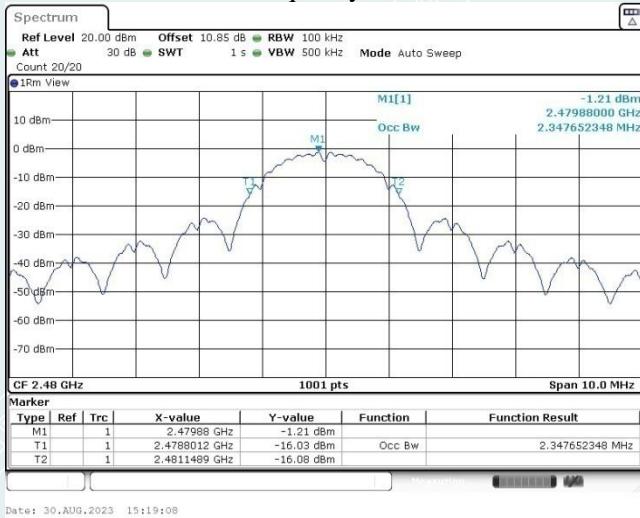
24.1°C/68%RH/101.0kPa

| Test Mode | Frequency [MHz] | OCB[MHz] | F <sub>L</sub> [MHz] | F <sub>H</sub> [MHz] | Limit[MHz]     | Verdict |
|-----------|-----------------|----------|----------------------|----------------------|----------------|---------|
| Thread    | 2405            | 2.348    | 2403.8012            | 2406.1489            | 2400 to 2483.5 | PASS    |
|           | 2440            | 2.348    | 2438.8012            | 2441.1489            | 2400 to 2483.5 | PASS    |
|           | 2480            | 2.348    | 2478.8012            | 2481.1489            | 2400 to 2483.5 | PASS    |

### 7.3.5 TEST SCREENSHOTS



Lowest Frequency: 2405MHz



Highest Frequency: 2480MHz

Middle Frequency: 2440MHz

## 7.4 TRANSMITTER UNWANTED EMISSIONS IN THE OUT-OF-BAND DOMAIN

Test Requirement: EN300 328 V2.2.2/ 4.3.2.8

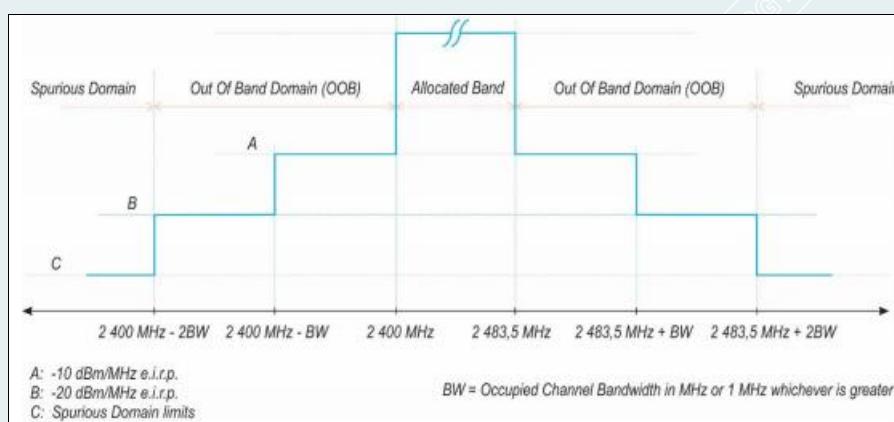
Test Method: EN300 328 V2.2.2/5.4.8.2.1

### 7.4.1 LIMIT

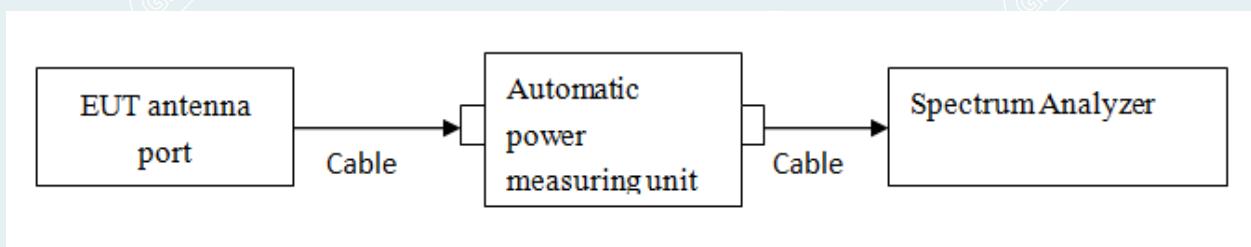
This requirement applies to all types of FHSS equipment and all types of non-FHSS equipment.

The transmitter unwanted emissions in the out-of-band domain but outside the allocated band, shall not exceed the values provided by the mask in figure 3.

The Out-of-band emissions are fulfilled by compliance with the Occupied Channel Bandwidth requirement.



### 7.4.2 TEST CONFIGURATION



### 7.4.3 TEST PROCEDURES

Test condition: Normal test conditions.

Test channel: 2405MHz, 2480MHz for Thread

Test procedure: Test procedure is according to EN 300 328 V2.2.2/5.4.8.2.1

#### 7.4.4 TEST RESULTS

Test Date (yy-mm-dd): 2023-08-30

Test Engineer: Qin Tingting

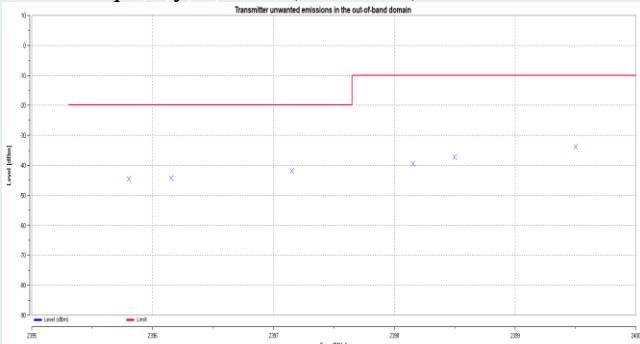
Test environment: Normal condition:

24.1°C/68%RH/101.0kPa

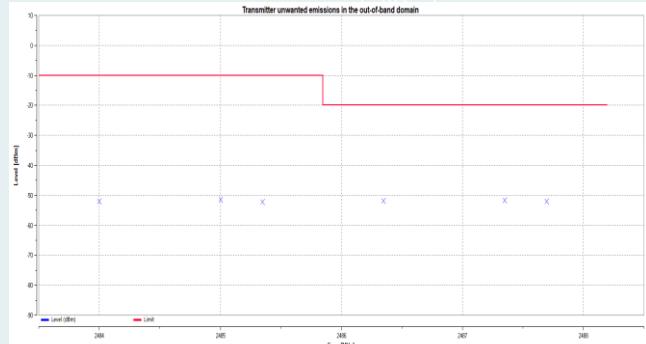
| Test Mode | Frequency [MHz] | Freq. [MHz] | Level[dBm] | Limit[dBm] | Verdict |
|-----------|-----------------|-------------|------------|------------|---------|
| Thread    | 2405            | 2395.804    | -44.54     | -20.00     | PASS    |
|           |                 | 2396.152    | -44.12     | -20.00     | PASS    |
|           |                 | 2397.152    | -41.85     | -20.00     | PASS    |
|           |                 | 2398.152    | -39.49     | -10.00     | PASS    |
|           |                 | 2398.5      | -37.19     | -10.00     | PASS    |
|           |                 | 2399.5      | -33.81     | -10.00     | PASS    |
|           |                 | 2484        | -51.97     | -10.00     | PASS    |
|           |                 | 2485        | -51.50     | -10.00     | PASS    |
|           |                 | 2485.348    | -52.16     | -10.00     | PASS    |
|           |                 | 2486.348    | -51.85     | -20.00     | PASS    |
|           |                 | 2487.348    | -51.61     | -20.00     | PASS    |
|           |                 | 2487.696    | -51.96     | -20.00     | PASS    |
| Thread    | 2480            | 2395.804    | -51.65     | -20.00     | PASS    |
|           |                 | 2396.152    | -51.49     | -20.00     | PASS    |
|           |                 | 2397.152    | -51.49     | -20.00     | PASS    |
|           |                 | 2398.152    | -51.31     | -10.00     | PASS    |
|           |                 | 2398.5      | -51.22     | -10.00     | PASS    |
|           |                 | 2399.5      | -51.14     | -10.00     | PASS    |
|           |                 | 2484        | -29.56     | -10.00     | PASS    |
|           |                 | 2485        | -33.86     | -10.00     | PASS    |
|           |                 | 2485.348    | -34.04     | -10.00     | PASS    |
|           |                 | 2486.348    | -37.42     | -20.00     | PASS    |
|           |                 | 2487.348    | -40.16     | -20.00     | PASS    |
|           |                 | 2487.696    | -41.60     | -20.00     | PASS    |

#### 7.4.5 TEST SCREENSHOTS

Test Frequency: Thread (2405MHz)

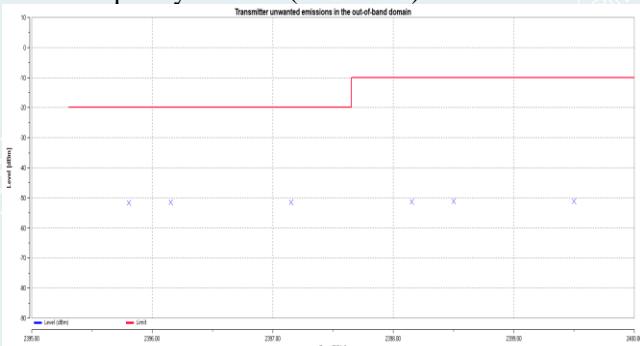


Left side of working frequency band

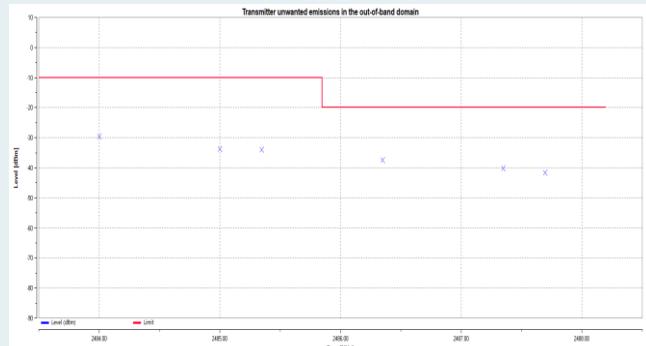


Right side of working frequency band

Test Frequency: Thread (2480MHz)



Left side of working frequency band



Right side of working frequency band

----- The following blanks -----

## 7.5 TRANSMITTER UNWANTED EMISSIONS IN THE SPURIOUS DOMAIN

Test Requirement: EN300 328 V2.2.2/ 4.3.2.9

Test Method: EN300 328 V2.2.2/5.4.9.2.2

### 7.5.1 LIMIT

This requirement applies to all types of non-FHSS equipment.

The transmitter unwanted emissions in the spurious domain shall not exceed the values given in table 2. In case of equipment with antenna connectors, these limits apply to emissions at the antenna port (conducted). For emissions radiated by the cabinet or emissions radiated by integral antenna equipment (without antenna connectors), these limits are e.r.p. for emissions up to 1 GHz and as e.i.r.p. for emissions above 1 GHz.

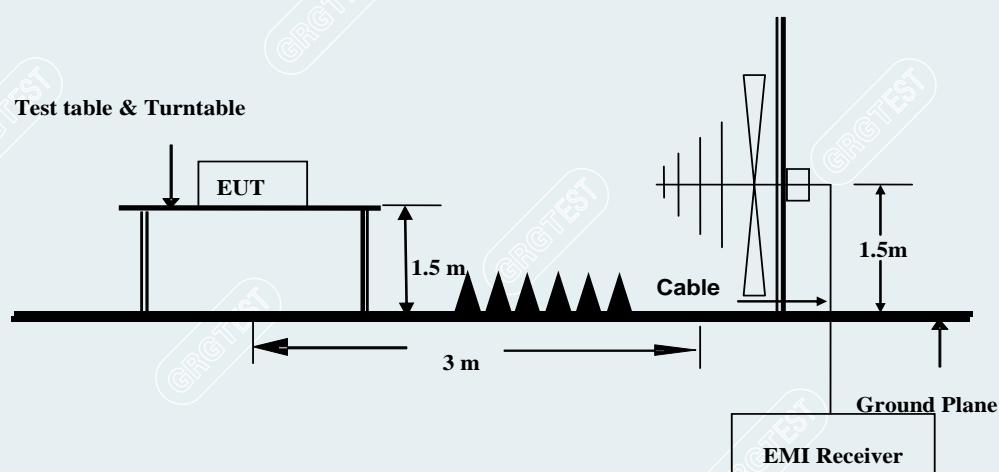
Note: This test uses conducted emissions measurement and Radiated emissions measurement.

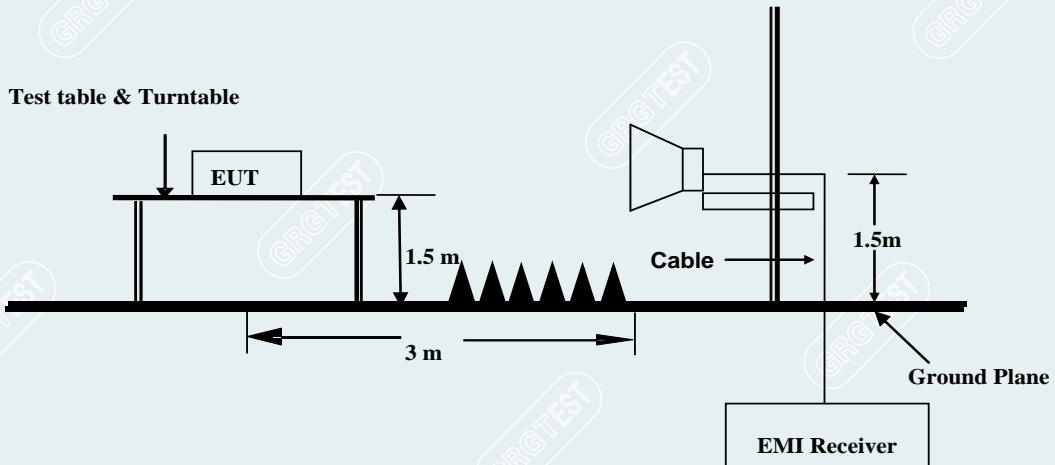
Table 2: Transmitter limits for spurious emissions

| Frequency range     | Maximum power | Bandwidth |
|---------------------|---------------|-----------|
| 30 MHz to 47 MHz    | -36 dBm       | 100 kHz   |
| 47 MHz to 74 MHz    | -54 dBm       | 100 kHz   |
| 74 MHz to 87,5 MHz  | -36 dBm       | 100 kHz   |
| 87,5 MHz to 118 MHz | -54 dBm       | 100 kHz   |
| 118 MHz to 174 MHz  | -36 dBm       | 100 kHz   |
| 174 MHz to 230 MHz  | -54 dBm       | 100 kHz   |
| 230 MHz to 470 MHz  | -36 dBm       | 100 kHz   |
| 470 MHz to 694 MHz  | -54 dBm       | 100 kHz   |
| 694 MHz to 1 GHz    | -36 dBm       | 100 kHz   |
| 1 GHz to 12,75 GHz  | -30 dBm       | 1 MHz     |

### 7.5.2 TEST CONFIGURATION

30MHz~1000MHz



**1000MHz~12750MHz****7.5.3 TEST PROCEDURES**

Test condition: Normal test conditions.

Test channel: Lowest channel: (2405MHz), Highest channel: (2480MHz)

Test procedure: Test procedure is according to Clause 5.4.9.2.2 of EN 300 328 V2.2.2

**7.5.4 DATA SAMPLE**

| Freq.<br>[MHz] | Reading<br>[dBm] | Level<br>[dBm] | Limit<br>[dBm] | Margin<br>[dB] | Factor<br>[dB] | Detector | Polarity   |
|----------------|------------------|----------------|----------------|----------------|----------------|----------|------------|
| XXX            | -49.71           | -57.90         | -30.00         | 27.90          | -8.19          | RMS      | Horizontal |

Frequency (MHz) = Emission frequency in MHz

Reading (dBm) = Uncorrected Analyzer / Receiver reading

Level (dBm) = Reading (dBm) + Factor (dB)

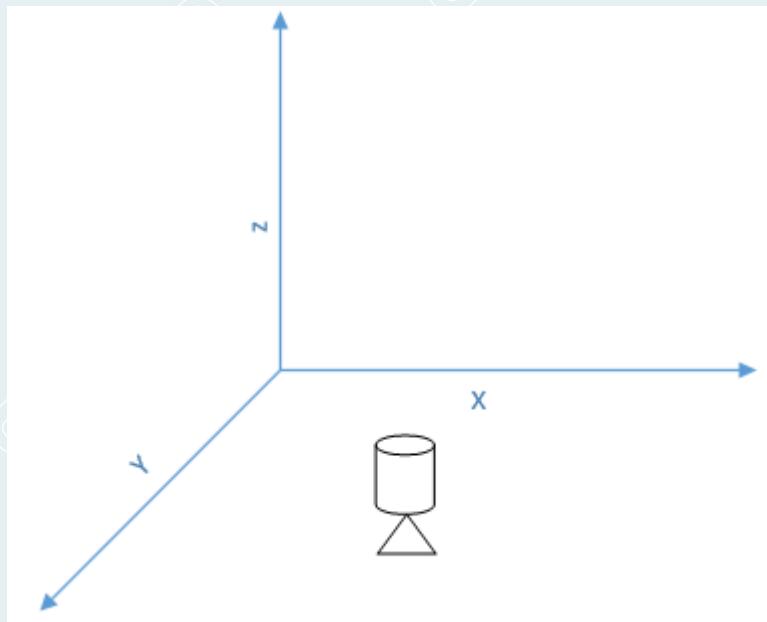
Limit (dBm) = Limit stated in standard

Margin (dB) = Limit(dBm) – Level (dBm)

RMS = Root Mean Square

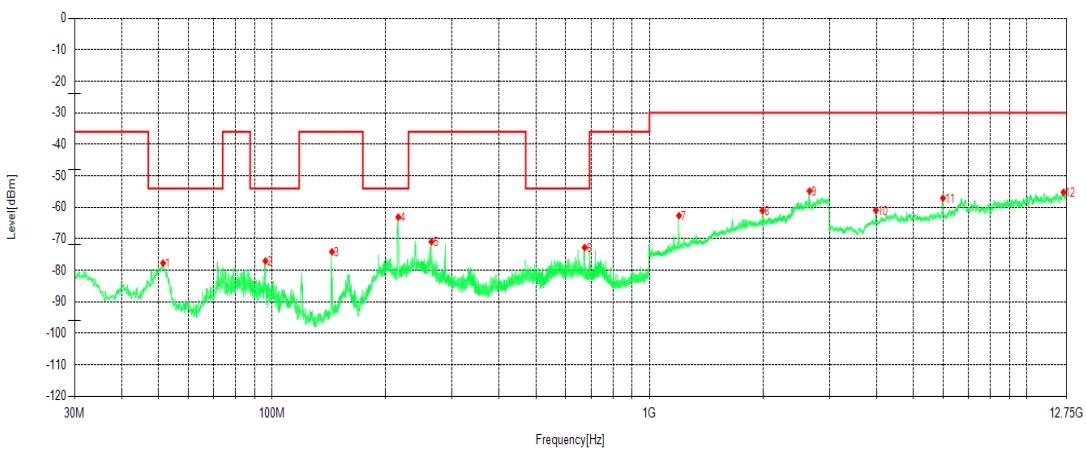
### 7.5.5 TEST RESULTS

The test are under 3-axes(X,Y,Z) position(X denotes lying on the table, Y denotes side stand and Z denotes vertical stand), After pre-test, It was found that the worse radiation emission was get at the Z position. So the data shown the Z position only.



----- The following blanks -----

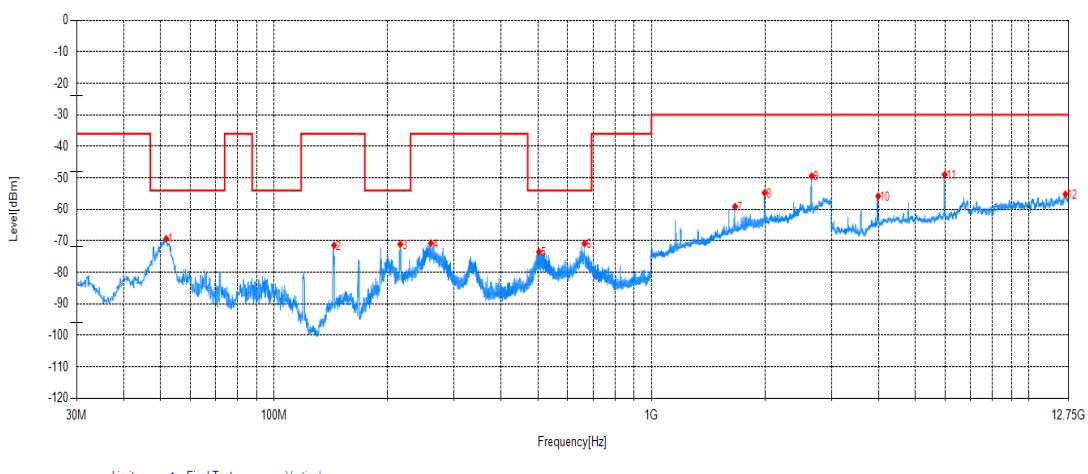
|              |                       |                |                            |
|--------------|-----------------------|----------------|----------------------------|
| Project No   | E20230828994601       | EUT:           | Motion and Light Sensor P2 |
| Model:       | ML-S03D               | Sample No:     | E20230828994601-0006       |
| Mode:        | TX Thread_2405MHz     | Voltage:       | DC 3V                      |
| Environment: | 20.1°C/67%RH/101.0kPa | Test Engineer: | Gong Xuan                  |
| Test Date:   | 2023-08-30            | /              | /                          |



#### Suspected Data List

| NO. | Freq. [MHz] | Reading [dBm] | Level [dBm] | Limit [dBm] | Margin [dB] | Factor [dB] | Detector | Polarity   |
|-----|-------------|---------------|-------------|-------------|-------------|-------------|----------|------------|
| 1   | 51.437      | -60.62        | -77.71      | -54.00      | 23.71       | -17.09      | RMS      | Horizontal |
| 2   | 96.057      | -60.20        | -77.06      | -54.00      | 23.06       | -16.86      | RMS      | Horizontal |
| 3   | 144.169     | -54.78        | -74.15      | -36.00      | 38.15       | -19.37      | RMS      | Horizontal |
| 4   | 216.046     | -45.82        | -63.14      | -54.00      | 9.14        | -17.32      | RMS      | Horizontal |
| 5   | 264.449     | -56.03        | -70.94      | -36.00      | 34.94       | -14.91      | RMS      | Horizontal |
| 6   | 673.498     | -65.35        | -72.78      | -54.00      | 18.78       | -7.43       | RMS      | Horizontal |
| 7   | 1198.2      | -62.32        | -62.66      | -30.00      | 32.66       | -0.34       | RMS      | Horizontal |
| 8   | 1992        | -67.58        | -61.04      | -30.00      | 31.04       | 6.54        | RMS      | Horizontal |
| 9   | 2655.6      | -65.86        | -54.85      | -30.00      | 24.85       | 11.01       | RMS      | Horizontal |
| 10  | 3981.825    | -57.00        | -60.96      | -30.00      | 30.96       | -3.96       | RMS      | Horizontal |
| 11  | 5993.25     | -57.89        | -57.09      | -30.00      | 27.09       | 0.80        | RMS      | Horizontal |
| 12  | 12504.3     | -69.82        | -55.22      | -30.00      | 25.22       | 14.60       | RMS      | Horizontal |

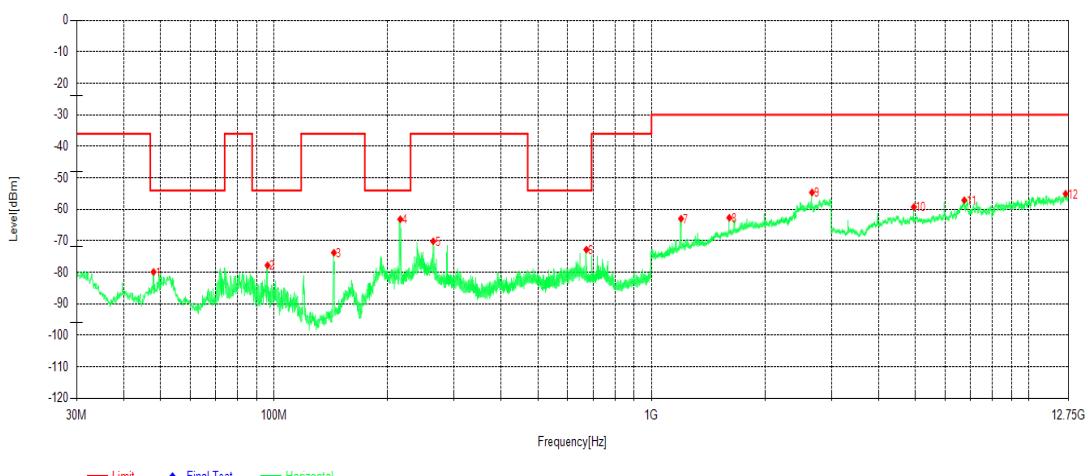
|              |                       |            |                            |
|--------------|-----------------------|------------|----------------------------|
| Project No   | E20230828994601       | EUT:       | Motion and Light Sensor P2 |
| Model:       | ML-S03D               | Sample No: | E20230828994601-0006       |
| Mode:        | TX Thread_2405MHz     | Voltage:   | DC 3V                      |
| Environment: | 20.1°C/67%RH/101.0kPa | Engineer:  | Gong Xuan                  |
| Test Date:   | 2023-08-30            | /          | /                          |



#### Suspected Data List

| NO. | Freq. [MHz] | Reading [dBm] | Level [dBm] | Limit [dBm] | Margin [dB] | Factor [dB] | Detector | Polarity |
|-----|-------------|---------------|-------------|-------------|-------------|-------------|----------|----------|
| 1   | 51.825      | -56.12        | -69.36      | -54.00      | 15.36       | -13.24      | RMS      | Vertical |
| 2   | 144.266     | -52.18        | -71.44      | -36.00      | 35.44       | -19.26      | RMS      | Vertical |
| 3   | 215.949     | -53.58        | -71.10      | -54.00      | 17.10       | -17.52      | RMS      | Vertical |
| 4   | 260.278     | -54.36        | -70.73      | -36.00      | 34.73       | -16.37      | RMS      | Vertical |
| 5   | 503.554     | -63.98        | -73.52      | -54.00      | 19.52       | -9.54       | RMS      | Vertical |
| 6   | 664.38      | -63.54        | -70.86      | -54.00      | 16.86       | -7.32       | RMS      | Vertical |
| 7   | 1665.8      | -63.88        | -59.12      | -30.00      | 29.12       | 4.76        | RMS      | Vertical |
| 8   | 1994        | -61.71        | -54.78      | -30.00      | 24.78       | 6.93        | RMS      | Vertical |
| 9   | 2657.6      | -59.77        | -49.45      | -30.00      | 19.45       | 10.32       | RMS      | Vertical |
| 10  | 3988.65     | -52.29        | -55.84      | -30.00      | 25.84       | -3.55       | RMS      | Vertical |
| 11  | 5984.475    | -50.02        | -48.98      | -30.00      | 18.98       | 1.04        | RMS      | Vertical |
| 12  | 12507.22    | -69.94        | -55.20      | -30.00      | 25.20       | 14.74       | RMS      | Vertical |

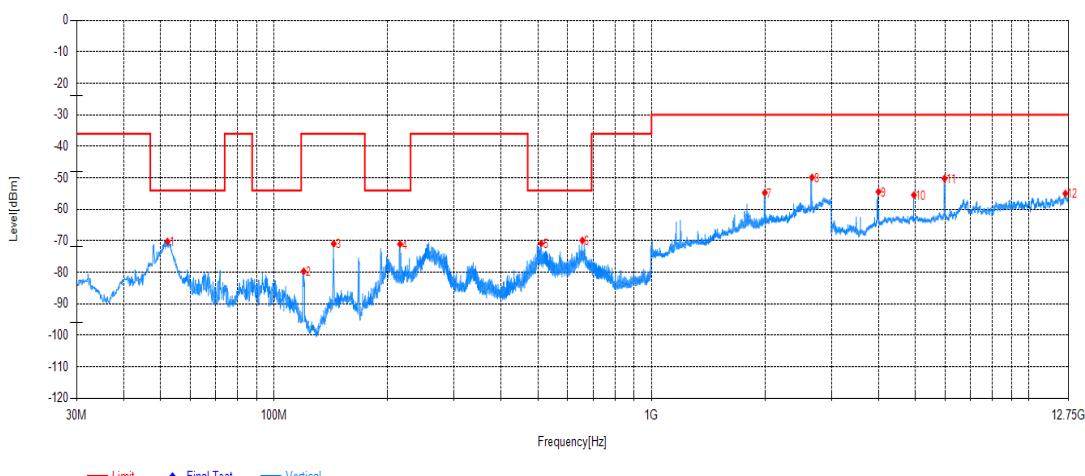
|              |                       |            |                            |
|--------------|-----------------------|------------|----------------------------|
| Project No   | E20230828994601       | EUT:       | Motion and Light Sensor P2 |
| Model:       | ML-S03D               | Sample No: | E20230828994601-0006       |
| Mode:        | TX Thread_2480MHz     | Voltage:   | DC 3V                      |
| Environment: | 20.1°C/67%RH/101.0kPa | Engineer:  | Gong Xuan                  |
| Test Date:   | 2023-08-30            | /          | /                          |



#### Suspected Data List

| NO. | Freq. [MHz] | Reading [dBm] | Level [dBm] | Limit [dBm] | Margin [dB] | Factor [dB] | Detector | Polarity   |
|-----|-------------|---------------|-------------|-------------|-------------|-------------|----------|------------|
| 1   | 47.945      | -63.63        | -79.90      | -54.00      | 25.90       | -16.27      | RMS      | Horizontal |
| 2   | 96.154      | -60.95        | -77.81      | -54.00      | 23.81       | -16.86      | RMS      | Horizontal |
| 3   | 144.072     | -54.46        | -73.81      | -36.00      | 37.81       | -19.35      | RMS      | Horizontal |
| 4   | 216.046     | -45.85        | -63.17      | -54.00      | 9.17        | -17.32      | RMS      | Horizontal |
| 5   | 264.061     | -55.25        | -70.18      | -36.00      | 34.18       | -14.93      | RMS      | Horizontal |
| 6   | 672.237     | -65.32        | -72.83      | -54.00      | 18.83       | -7.51       | RMS      | Horizontal |
| 7   | 1198        | -62.65        | -63.00      | -30.00      | 33.00       | -0.35       | RMS      | Horizontal |
| 8   | 1608.8      | -67.13        | -62.69      | -30.00      | 32.69       | 4.44        | RMS      | Horizontal |
| 9   | 2662.6      | -65.78        | -54.66      | -30.00      | 24.66       | 11.12       | RMS      | Horizontal |
| 10  | 4958.775    | -58.24        | -59.27      | -30.00      | 29.27       | -1.03       | RMS      | Horizontal |
| 11  | 6746.925    | -63.05        | -57.12      | -30.00      | 27.12       | 5.93        | RMS      | Horizontal |
| 12  | 12517.95    | -69.42        | -55.06      | -30.00      | 25.06       | 14.36       | RMS      | Horizontal |

|              |                       |            |                            |
|--------------|-----------------------|------------|----------------------------|
| Project No   | E20230828994601       | EUT:       | Motion and Light Sensor P2 |
| Model:       | ML-S03D               | Sample No: | E20230828994601-0006       |
| Mode:        | TX Thread_2480MHz     | Voltage:   | DC 3V                      |
| Environment: | 20.1°C/67%RH/101.0kPa | Engineer:  | Gong Xuan                  |
| Test Date:   | 2023-08-30            | /          | /                          |



#### Suspected Data List

| NO. | Freq. [MHz] | Reading [dBm] | Level [dBm] | Limit [dBm] | Margin [dB] | Factor [dB] | Detector | Polarity |
|-----|-------------|---------------|-------------|-------------|-------------|-------------|----------|----------|
| 1   | 52.213      | -57.00        | -70.21      | -54.00      | 16.21       | -13.21      | RMS      | Vertical |
| 2   | 119.822     | -59.71        | -79.71      | -36.00      | 43.71       | -20.00      | RMS      | Vertical |
| 3   | 143.975     | -51.63        | -70.92      | -36.00      | 34.92       | -19.29      | RMS      | Vertical |
| 4   | 215.658     | -53.53        | -71.05      | -54.00      | 17.05       | -17.52      | RMS      | Vertical |
| 5   | 510.344     | -61.31        | -70.88      | -54.00      | 16.88       | -9.57       | RMS      | Vertical |
| 6   | 656.038     | -62.80        | -69.90      | -54.00      | 15.90       | -7.10       | RMS      | Vertical |
| 7   | 1997        | -61.44        | -54.73      | -30.00      | 24.73       | 6.71        | RMS      | Vertical |
| 8   | 2662.8      | -60.33        | -49.86      | -30.00      | 19.86       | 10.47       | RMS      | Vertical |
| 9   | 3996.45     | -51.03        | -54.44      | -30.00      | 24.44       | -3.41       | RMS      | Vertical |
| 10  | 4958.775    | -54.58        | -55.47      | -30.00      | 25.47       | -0.89       | RMS      | Vertical |
| 11  | 5977.65     | -51.28        | -50.21      | -30.00      | 20.21       | 1.07        | RMS      | Vertical |
| 12  | 12502.35    | -69.84        | -54.99      | -30.00      | 24.99       | 14.85       | RMS      | Vertical |

## 7.6 RECEIVER SPURIOUS EMISSIONS

Test Requirement: EN300 328 V2.2.2

Test Method: EN300 328 V2.2.2

### 7.6.1 LIMIT

The spurious emissions of the receiver shall not exceed the values given in table 3.

In case of equipment with antenna connectors, these limits apply to emissions at the antenna port (conducted).

For emissions radiated by the cabinet or for emissions radiated by integral antenna equipment (without antenna connectors), these limits are e.r.p for emissions up to 1 GHz and e.i.r.p for emissions above 1 GHz.

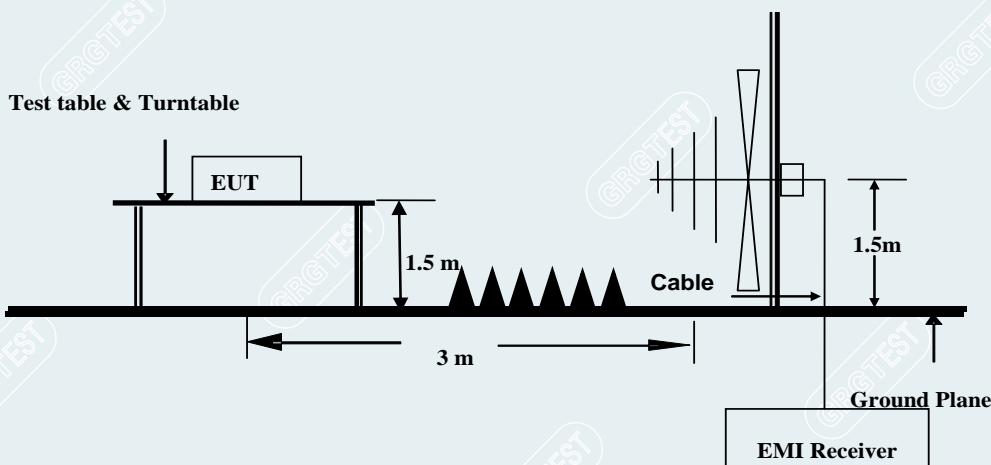
This device uses Radiated measurement.

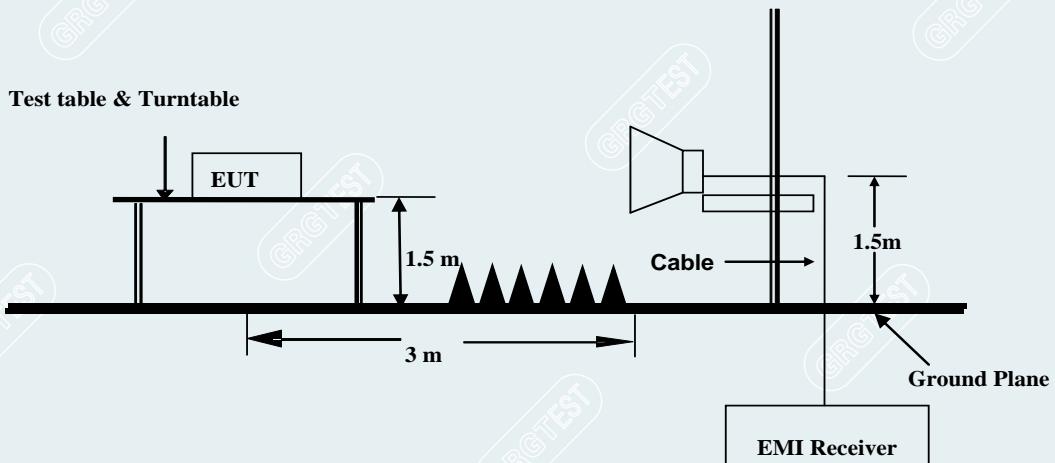
Table 3: Spurious emission limits for receivers

| Frequency range    | Maximum power | Bandwidth |
|--------------------|---------------|-----------|
| 30 MHz to 1 GHz    | -57 dBm       | 100 kHz   |
| 1 GHz to 12,75 GHz | -47 dBm       | 1 MHz     |

### 7.6.2 TEST CONFIGURATION

#### 30MHz-1000MHz



**1000MHz-12750MHz****7.6.3 TEST PROCEDURES**

Test channel: Lowest channel: (2405MHz), Highest channel: (2480MHz)

Test condition: Normal test conditions.

Test procedure: Test procedure is according to Clause 5.4.10.2.2 of EN 300 328 V2.2.2

**7.6.4 DATA SAMPLE**

| Freq.<br>[MHz] | Reading<br>[dBm] | Level<br>[dBm] | Limit<br>[dBm] | Margin<br>[dB] | Factor<br>[dB] | Detector | Polarity   |
|----------------|------------------|----------------|----------------|----------------|----------------|----------|------------|
| XXX            | -58.02           | -73.33         | -57.00         | 16.33          | -15.31         | RMS      | Horizontal |

Frequency (MHz) = Emission frequency in MHz

Reading (dBm) = Uncorrected Analyzer / Receiver reading

Level (dBm) = Reading (dBm) + Factor (dB)

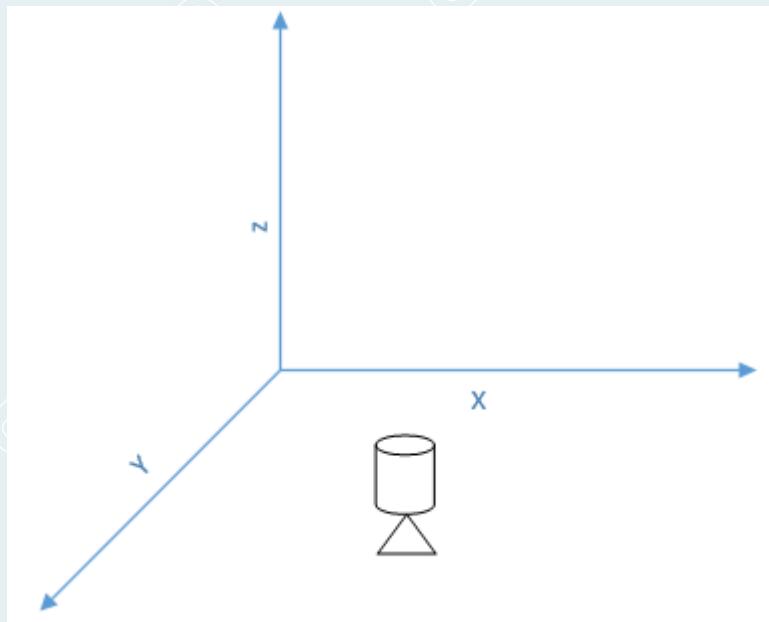
Limit (dBm) = Limit stated in standard

Margin (dB) = Limit(dBm) – Level (dBm)

RMS = Root Mean Square

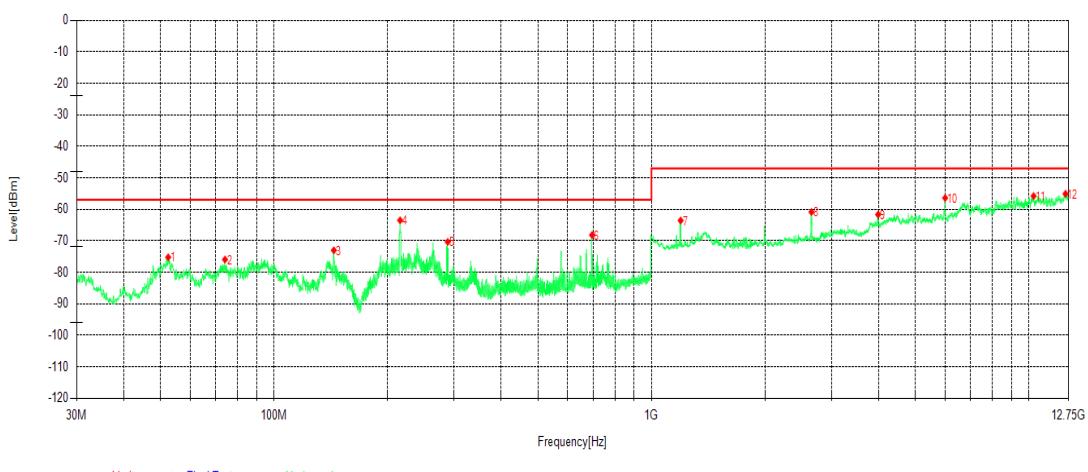
### 7.6.5 TEST RESULTS

The test are under 3-axes(X,Y,Z) position(X denotes lying on the table, Y denotes side stand and Z denotes vertical stand), After pre-test, It was found that the worse radiation emission was get at the Z position. So the data shown the Z position only.



----- The following blanks -----

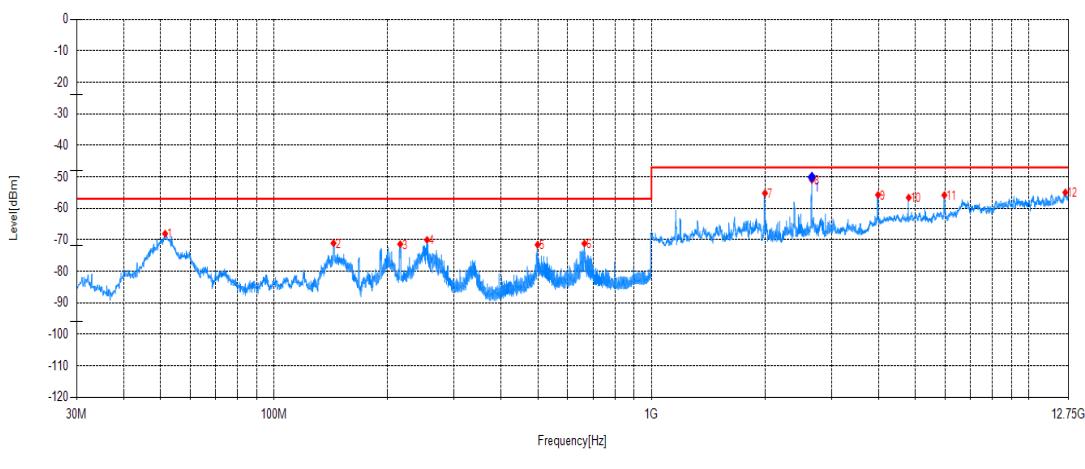
|              |                        |            |                            |
|--------------|------------------------|------------|----------------------------|
| Project No   | E20230828994601        | EUT:       | Motion and Light Sensor P2 |
| Model:       | ML-S03D                | Sample No: | E20230828994601-0006       |
| Mode:        | RX Thread_2405MHz      | Voltage:   | DC 3V                      |
| Environment: | 20.1 °C/67%RH/101.0kPa | Engineer:  | Gong Xuan                  |
| Test Data:   | 2023-08-30             | /          | /                          |



#### Suspected Data List

| NO. | Freq. [MHz] | Reading [dBm] | Level [dBm] | Limit [dBm] | Margin [dB] | Factor [dB] | Detector | Polarity   |
|-----|-------------|---------------|-------------|-------------|-------------|-------------|----------|------------|
| 1   | 52.407      | -58.03        | -75.24      | -57.00      | 18.24       | -17.21      | RMS      | Horizontal |
| 2   | 74.135      | -53.89        | -75.96      | -57.00      | 18.96       | -22.07      | RMS      | Horizontal |
| 3   | 144.072     | -53.69        | -73.04      | -57.00      | 16.04       | -19.35      | RMS      | Horizontal |
| 4   | 215.755     | -46.18        | -63.51      | -57.00      | 6.51        | -17.33      | RMS      | Horizontal |
| 5   | 288.408     | -56.23        | -70.36      | -57.00      | 13.36       | -14.13      | RMS      | Horizontal |
| 6   | 695.905     | -61.72        | -68.18      | -57.00      | 11.18       | -6.46       | RMS      | Horizontal |
| 7   | 1195.05     | -49.93        | -63.57      | -47.00      | 16.57       | -13.64      | RMS      | Horizontal |
| 8   | 2654.4      | -50.87        | -60.87      | -47.00      | 13.87       | -10.00      | RMS      | Horizontal |
| 9   | 3986.85     | -57.83        | -61.67      | -47.00      | 14.67       | -3.84       | RMS      | Horizontal |
| 10  | 6000.8      | -58.11        | -56.42      | -47.00      | 9.42        | 1.69        | RMS      | Horizontal |
| 11  | 10290.72    | -67.88        | -55.79      | -47.00      | 8.79        | 12.09       | RMS      | Horizontal |
| 12  | 12505.6     | -69.76        | -55.06      | -47.00      | 8.06        | 14.70       | RMS      | Horizontal |

|              |                       |            |                            |
|--------------|-----------------------|------------|----------------------------|
| Project No   | E20230828994601       | EUT:       | Motion and Light Sensor P2 |
| Model:       | ML-S03D               | Sample No: | E20230828994601-0006       |
| Mode:        | RX Thread_2405MHz     | Voltage:   | DC 3V                      |
| Environment: | 20.1°C/67%RH/101.0kPa | Engineer:  | Gong Xuan                  |
| Test Data:   | 2023-08-30            | /          | /                          |



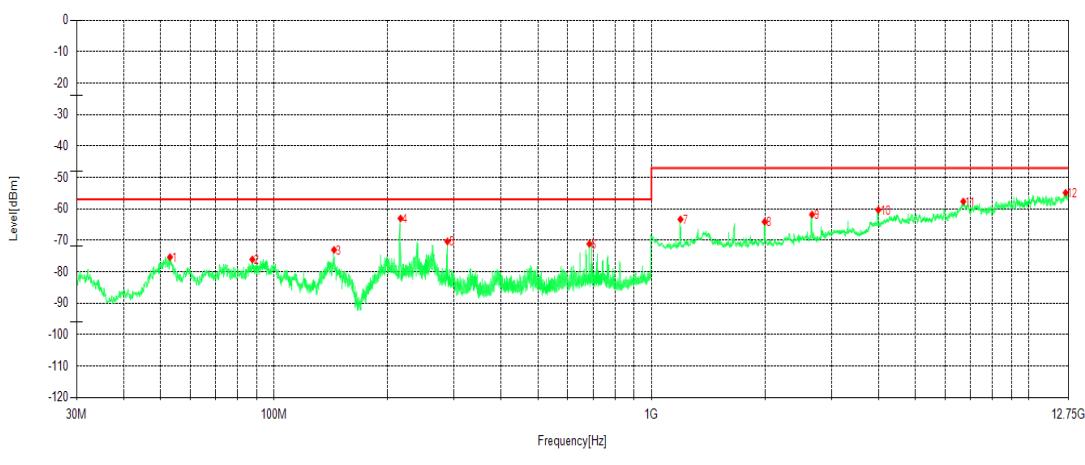
#### Suspected Data List

| NO. | Freq. [MHz] | Reading [dBm] | Level [dBm] | Limit [dBm] | Margin [dB] | Factor [dB] | Detector | Polarity |
|-----|-------------|---------------|-------------|-------------|-------------|-------------|----------|----------|
| 1   | 51.437      | -54.78        | -68.06      | -57.00      | 11.06       | -13.28      | RMS      | Vertical |
| 2   | 143.781     | -51.76        | -71.06      | -57.00      | 14.06       | -19.30      | RMS      | Vertical |
| 3   | 215.949     | -53.88        | -71.40      | -57.00      | 14.40       | -17.52      | RMS      | Vertical |
| 4   | 254.361     | -53.73        | -70.04      | -57.00      | 13.04       | -16.31      | RMS      | Vertical |
| 5   | 499.48      | -62.04        | -71.59      | -57.00      | 14.59       | -9.55       | RMS      | Vertical |
| 6   | 664.477     | -63.85        | -71.18      | -57.00      | 14.18       | -7.33       | RMS      | Vertical |
| 7   | 1998.75     | -43.77        | -55.20      | -47.00      | 8.20        | -11.43      | RMS      | Vertical |
| 8   | 2661.45     | -41.12        | -51.00      | -47.00      | 4.00        | -9.88       | RMS      | Vertical |
| 9   | 3984.5      | -52.19        | -55.74      | -47.00      | 8.74        | -3.55       | RMS      | Vertical |
| 10  | 4807        | -54.87        | -56.60      | -47.00      | 9.60        | -1.73       | RMS      | Vertical |
| 11  | 5972.6      | -57.12        | -55.82      | -47.00      | 8.82        | 1.30        | RMS      | Vertical |
| 12  | 12498.55    | -69.95        | -54.97      | -47.00      | 7.97        | 14.98       | RMS      | Vertical |

#### Final Data List

| NO. | Freq. [MHz] | Reading [dBm] | Level [dBm] | Limit [dBm] | Margin [dB] | Factor [dB] | Detector | Polarity |
|-----|-------------|---------------|-------------|-------------|-------------|-------------|----------|----------|
| 1   | 2661.45     | -40.21        | -50.09      | -47.00      | 3.09        | -9.88       | RMS      | Vertical |

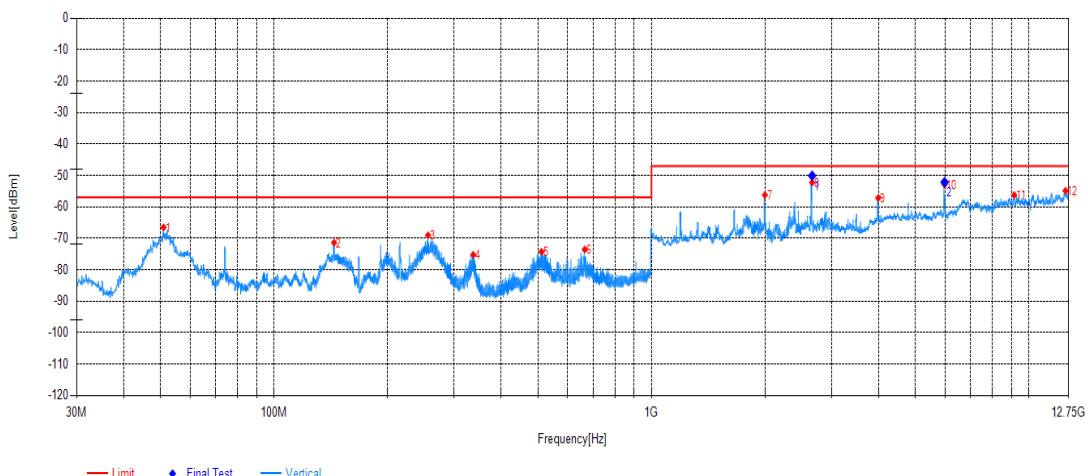
|              |                        |            |                            |
|--------------|------------------------|------------|----------------------------|
| Project No   | E20230828994601        | EUT:       | Motion and Light Sensor P2 |
| Model:       | ML-S03D                | Sample No: | E20230828994601-0006       |
| Mode:        | RX Thread_2480MHz      | Voltage:   | DC 3V                      |
| Environment: | 20.1 °C/67%RH/101.0kPa | Engineer:  | Gong Xuan                  |
| Test Data:   | 2023-08-30             | /          | /                          |



#### Suspected Data List

| NO. | Freq. [MHz] | Reading [dBm] | Level [dBm] | Limit [dBm] | Margin [dB] | Factor [dB] | Detector | Polarity   |
|-----|-------------|---------------|-------------|-------------|-------------|-------------|----------|------------|
| 1   | 52.989      | -58.08        | -75.37      | -57.00      | 18.37       | -17.29      | RMS      | Horizontal |
| 2   | 87.618      | -57.63        | -76.10      | -57.00      | 19.10       | -18.47      | RMS      | Horizontal |
| 3   | 144.266     | -53.66        | -73.05      | -57.00      | 16.05       | -19.39      | RMS      | Horizontal |
| 4   | 216.337     | -45.72        | -63.03      | -57.00      | 6.03        | -17.31      | RMS      | Horizontal |
| 5   | 288.02      | -56.23        | -70.37      | -57.00      | 13.37       | -14.14      | RMS      | Horizontal |
| 6   | 684.653     | -64.42        | -71.14      | -57.00      | 14.14       | -6.72       | RMS      | Horizontal |
| 7   | 1193.875    | -49.69        | -63.34      | -47.00      | 16.34       | -13.65      | RMS      | Horizontal |
| 8   | 1995.225    | -52.81        | -64.12      | -47.00      | 17.12       | -11.31      | RMS      | Horizontal |
| 9   | 2662.625    | -51.84        | -61.81      | -47.00      | 14.81       | -9.97       | RMS      | Horizontal |
| 10  | 3993.9      | -56.54        | -60.34      | -47.00      | 13.34       | -3.80       | RMS      | Horizontal |
| 11  | 6703.45     | -63.02        | -57.66      | -47.00      | 10.66       | 5.36        | RMS      | Horizontal |
| 12  | 12511.47    | -69.51        | -54.90      | -47.00      | 7.90        | 14.61       | RMS      | Horizontal |

|              |                        |            |                            |
|--------------|------------------------|------------|----------------------------|
| Project No   | E20230828994601        | EUT:       | Motion and Light Sensor P2 |
| Model:       | ML-S03D                | Sample No: | E20230828994601-0006       |
| Mode:        | RX Thread_2480MHz      | Voltage:   | DC 3V                      |
| Environment: | 20.1 °C/67%RH/101.0kPa | Engineer:  | Gong Xuan                  |
| Test Data:   | 2023-08-30             | /          | /                          |



#### Suspected Data List

| NO. | Freq. [MHz] | Reading [dBm] | Level [dBm] | Limit [dBm] | Margin [dB] | Factor [dB] | Detector | Polarity |
|-----|-------------|---------------|-------------|-------------|-------------|-------------|----------|----------|
| 1   | 50.952      | -53.23        | -66.55      | -57.00      | 9.55        | -13.32      | RMS      | Vertical |
| 2   | 144.266     | -52.09        | -71.35      | -57.00      | 14.35       | -19.26      | RMS      | Vertical |
| 3   | 255.913     | -52.72        | -69.05      | -57.00      | 12.05       | -16.33      | RMS      | Vertical |
| 4   | 337.005     | -61.82        | -75.24      | -57.00      | 18.24       | -13.42      | RMS      | Vertical |
| 5   | 511.508     | -64.77        | -74.27      | -57.00      | 17.27       | -9.50       | RMS      | Vertical |
| 6   | 665.447     | -66.16        | -73.57      | -57.00      | 16.57       | -7.41       | RMS      | Vertical |
| 7   | 1997.575    | -44.78        | -56.22      | -47.00      | 9.22        | -11.44      | RMS      | Vertical |
| 8   | 2664.975    | -42.38        | -52.24      | -47.00      | 5.24        | -9.86       | RMS      | Vertical |
| 9   | 3989.2      | -53.71        | -57.19      | -47.00      | 10.19       | -3.48       | RMS      | Vertical |
| 10  | 5979.65     | -54.35        | -52.89      | -47.00      | 5.89        | 1.46        | RMS      | Vertical |
| 11  | 9145.1      | -66.05        | -56.22      | -47.00      | 9.22        | 9.83        | RMS      | Vertical |
| 12  | 12497.37    | -69.85        | -54.90      | -47.00      | 7.90        | 14.95       | RMS      | Vertical |

#### Final Data List

| NO. | Freq. [MHz] | Reading [dBm] | Level [dBm] | Limit [dBm] | Margin [dB] | Factor [dB] | Detector | Polarity |
|-----|-------------|---------------|-------------|-------------|-------------|-------------|----------|----------|
| 1   | 2664.975    | -40.24        | -50.10      | -47.00      | 3.10        | -9.86       | RMS      | Vertical |
| 2   | 5979.65     | -53.59        | -52.13      | -47.00      | 5.13        | 1.46        | RMS      | Vertical |

## 7.7 RECEIVER BLOCKING

Test Requirement: EN300 328 V2.2.2/ 5.4.11.1

Test Method: EN300 328 V2.2.2/ 5.4.11.2

### 7.7.1 LIMIT

For equipment that supports a PER or FER test to be performed, the minimum performance criterion shall be a PER or FER less than or equal to 10 %.

For equipment that does not support a PER or a FER test to be performed, the minimum performance criterion shall be no loss of the wireless transmission function needed for the intended use of the equipment.

The blocking levels at specified frequency offsets shall be equal to or greater than the limits defined for.

#### Receiver Blocking parameters for Receiver Category 1 equipment

| Wanted signal mean power from companion device (dBm) (see notes 1 and 4)         | Blocking Signal frequency (MHz)              | Blocking signal power (dBm) (see note 4) | Type of blocking signal |
|--|--|--|-------------------------|
| (-133dBm+10 × log <sub>10</sub> (OCBW)) or -68dBm whichever is less (see note 2) | 2380<br>2504                                 |  |                         |
| (-139dBm+10 × log <sub>10</sub> (OCBW)) or -74dBm whichever is less (see note 3) | 2300<br>2330<br>2360<br>2524<br>2584<br>2674 | -34                                      | CW                      |

NOTE 1: OCBW is in Hz.

NOTE 2: In case of radiated measurements using a companion device and the level of the wanted signal from the companion device cannot be determined, a relative test may be performed using a wanted signal up to P<sub>min</sub> + 26 dB where P<sub>min</sub> is the minimum level of wanted signal required to meet the minimum performance criteria as defined in clause 4.3.1.12.3 in the absence of any blocking signal.

NOTE 3: In case of radiated measurements using a companion device and the level of the wanted signal from the companion device cannot be determined, a relative test may be performed using a wanted signal up to P<sub>min</sub> + 20 dB where P<sub>min</sub> is the minimum level of wanted signal required to meet the minimum performance criteria as defined in clause 4.3.1.12.3 in the absence of any blocking signal.

NOTE 4: The level specified is the level at the UUT receiver input assuming a 0 dBi antenna assembly gain. In case of conducted measurements, this level has to be corrected for the (in-band) antenna assembly gain (G). In case of radiated measurements, this level is equivalent to a power flux density (PFD) in front of the UUT antenna with the UUT being configured positioned as recorded in clause 5.4.3.2.2.

**Receiver Blocking parameters for Receiver Category 2 equipment**

| <b>Wanted signal mean power from companion device (dBm) (see notes 1 and 3)</b>                | <b>Blocking Signal frequency (MHz)</b> | <b>Blocking signal power (dBm) (see note 3)</b> | <b>Type of blocking signal</b> |
|--|--|---|--------------------------------|
| (-139dBm+10 × log <sub>10</sub> (OCBW)+10dBm) or (-74dBm+10dBm) whichever is less (see note 2) | 2380<br>2504<br>2300<br>2584           | -34   | CW                             |

NOTE 1: OCBW is in Hz.

NOTE 2: In case of radiated measurements using a companion device and the level of the wanted signal from the companion device cannot be determined, a relative test may be performed using a wanted signal up to P<sub>min</sub> + 26 dB where P<sub>min</sub> is the minimum level of wanted signal required to meet the minimum performance criteria as defined in clause 4.3.1.12.3 in the absence of any blocking signal.

NOTE 3: The level specified is the level at the UUT receiver input assuming a 0 dBi antenna assembly gain. In case of conducted measurements, this level has to be corrected for the (in-band) antenna assembly gain (G). In case of radiated measurements, this level is equivalent to a power flux density (PFD) in front of the UUT antenna with the UUT being configured/positioned as recorded in clause 5.4.3.2.2.

**Receiver Blocking parameters for Receiver Category 3 equipment**

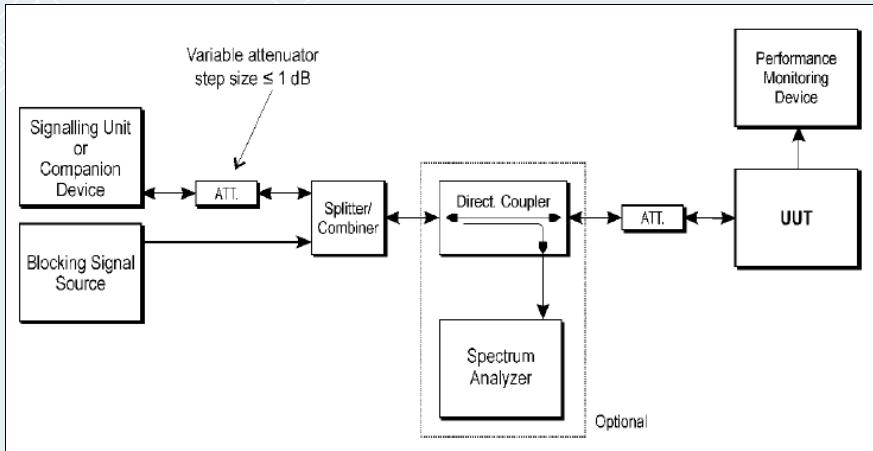
| <b>Wanted signal mean power from companion device (dBm) (see notes 1 and 3)</b>                | <b>Blocking Signal frequency (MHz)</b> | <b>Blocking signal power (dBm) (see note 3)</b> | <b>Type of blocking signal</b> |
|--|--|---|--------------------------------|
| (-139dBm+10 × log <sub>10</sub> (OCBW)+20dBm) or (-74dBm+20dBm) whichever is less (see note 2) | 2380<br>2504<br>2300<br>2584           | -34   | CW                             |

NOTE 1: OCBW is in Hz.

NOTE 2: In case of radiated measurements using a companion device and the level of the wanted signal from the companion device cannot be determined, a relative test may be performed using a wanted signal up to P<sub>min</sub> + 30 dB where P<sub>min</sub> is the minimum level of wanted signal required to meet the minimum performance criteria as defined in clause 4.3.1.12.3 in the absence of any blocking signal.

NOTE 3: The level specified is the level at the UUT receiver input assuming a 0 dBi antenna assembly gain. In case of conducted measurements, this level has to be corrected for the (in-band) antenna assembly gain (G). In case of radiated measurements, this level is equivalent to a power flux density (PFD) in front of the UUT antenna with the UUT being configured/positioned as recorded in clause 5.4.3.2.2.

## 7.7.2 TEST CONFIGURATION



## 7.7.3 TEST PROCEDURES

Test condition: Keep the EUT on the lowest and Highest channel working mode.

Test procedure: Step 1:

Test condition: For non-FHSS equipment, the UUT shall be set to the lowest operating channel on which the blocking test has to be performed (see clause 5.4.11.1).

Step 2:

The blocking signal generator is set to the first frequency as defined in the appropriate table corresponding to the receiver category and type of equipment.

Step 3:

With the blocking signal generator switched off, a communication link is established between the UUT and the associated companion device using the test setup shown in figure 6.

Unless the option provided in note 2 of the applicable table referred to in clause 5.4.11.2.1 is used, the level of the wanted signal shall be set to the value provided in the table corresponding to the receiver category and type of equipment. The test procedure defined in clause 5.4.2, and more in particular clause 5.4.2.2.1.2, can be used to measure the (conducted) level of the wanted signal however no correction shall be made for antenna gain of

the companion device (step 6 in clause 5.4.2.2.1.2 shall be ignored). This level may be measured directly at the output of the companion device and a correction is made for the coupling loss into the UUT. The actual level for the wanted signal shall be recorded in the test report.

When the option provided in note 2 of the applicable table referred to in clause 5.4.11.2.1 is used, the attenuation of the variable attenuator shall be increased in 1 dB steps to a value at which the minimum performance criteria as specified in clause 4.3.1.12.3 or clause 4.3.2.11.3 is still met. The resulting level for the wanted signal at the input of the UUT is  $P_{min}$ . This signal level ( $P_{min}$ ) is increased by the value provided in note 2 of the applicable table corresponding to the receiver category and type of equipment.

Step 4:

The blocking signal at the UUT is set to the level provided in the table corresponding to the receiver category and type of equipment.

If the performance criteria as specified in clause 4.3.1.12.3 or clause 4.3.2.11.3 are met then proceed to step 6.

Step 5:

If the performance criteria as specified in clause 4.3.1.12.3 or clause 4.3.2.11.3 is not met, step 3 and step 4 shall be repeated after that the frequency of the blocking signal set in step 2 has been increased with a value equal to the Occupied Channel Bandwidth except:

- For the blocking frequency 2 380 MHz, where this frequency offset shall be less than or equal to 10 MHz. If this frequency offset is more than 7 MHz, the level of the wanted

signal shall be increased by 3 dB.

- For the blocking frequency 2 503,5 MHz, where this frequency offset shall be less than or equal to 10 MHz. If this frequency offset is more than 7 MHz, the level of the wanted signal shall be decreased by 3 dB.

If the performance criteria as specified in clause 4.3.1.12.3 or clause 4.3.2.11.3 is still not met, step 3 and step 4 shall be repeated after that the frequency of the blocking signal set in step 2 has been decreased with a value equal to the Occupied Channel Bandwidth except:

- For the blocking frequency 2 380 MHz, where this frequency offset shall be less than or equal to 10 MHz. If this frequency offset is more than 7 MHz, the level of the wanted signal shall be decreased by 3 dB.

- For the blocking frequency 2 503,5 MHz, where this frequency offset shall be less than or equal to 10 MHz. If this frequency offset is more than 7 MHz, the level of the wanted signal shall be increased by 3 dB.

If the performance criteria as specified in clause 4.3.1.12.3 or clause 4.3.2.11.3 is still not met, the UUT fails to comply with the Receiver Blocking requirement and step 6 and step 7 are no longer required.

It shall be recorded in the test report whether the shift of blocking frequencies as described in the present step was used.

**Step 6:**

Repeat step 4 and step 5 for each remaining combination of frequency and level for the blocking signal as provided in the table corresponding to the receiver category and type of equipment.

**Step 7**

For non-FHSS equipment, repeat step 2 to step 6 with the UUT operating at the Highest operating channel on which the blocking test has to be performed (see clause 5.4.11.1).

**Step 8**

It shall be assessed and recorded in the test report whether the UUT complies with the Receiver Blocking requirement.

Keep the EUT on the lowest and Highest channel working mode.

If the equipment can be configured to operate with different Nominal Channel

Bandwidths (e.g. 20 MHz and 40 MHz) and different data rates, then the combination of the smallest channel bandwidth and the lowest data rate for this channel bandwidth which still allows the equipment to operate as intended shall be used.

**Remark:**

Test channel: Lowest channel: (2405MHz), Highest channel: (2480MHz)

#### 7.7.4 TEST RESULTS

Test Date (yy-mm-dd): 2023-08-30

Test Engineer: Qin Tingting

Test environment: Normal condition: 24.1°C/68%RH/101.0kPa

| Receiver Blocking   |                 |                     |                                 |                             |        |          |             |
|---------------------|-----------------|---------------------|---------------------------------|-----------------------------|--------|----------|-------------|
| Receiver Category 2 |                 |                     |                                 |                             |        |          |             |
| Test Mode           | Frequency (MHz) | Wanted signal (dBm) | Blocking signal frequency (MHz) | Blocking signal power (dBm) | PER(%) | limit(%) | Test Result |
| Thread              | 2405            | -64.29              | 2300                            | -33.05                      | 0.00   | 10       | Pass        |
|                     |                 |                     | 2380                            |                             | 0.10   | 10       | Pass        |
|                     | 2480            | -64.29              | 2504                            |                             | 0.00   | 10       | Pass        |
|                     |                 |                     | 2584                            |                             | 0.00   | 10       | Pass        |

Remark: CW=signal power(-34dBm) + Antenna Gain(0.95dBi).

## **APPENDIX A. PHOTOGRAPH OF THE TEST CONNECTION DIAGRAM**

Please refer to the attached document E20230828994601-15 Test Photo.

## **APPENDIX B. PHOTOGRAPH OF THE EUT**

Please refer to the attached document E20230828994601-16 EUT photo.

----- End of Report -----